Potential for Marine Protected Areas for Rocky Reef Bottomfish in Skagit County, Washington

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Abstract

The objectives of this project are to inform the public about rocky reef bottomfish and Marine Protected Area (MPA) issues and to solicit public comment and assistance on the establishment of MPAs in Skagit County. We will convene public meetings and partner group meetings to gather information on historical and current bottomfish catches in Skagit County and to determine the public's view on where to consider MPA locations. The public meetings are scheduled to start in November of 2000 and finish in February of 2001. Partner group meetings will likely be completed by this time. Preliminary results should be available for the conference. We intend to find if the public are interested in establishing MPAs in Skagit County in support of bottomfish recovery. We intend to determine the location of several rocky reef areas in Skagit County that have once or still do support bottomfish populations, based on public input, and that would be conducive to being established as MPAs. A summary report will be utilized to select several potential sites in Skagit County as MPAs and designate sites for further study.

Introduction

Reports have become commonplace during the last decade about population crashes and general depletion of many marine fishery resources. While many resource populations may be periodically impacted by natural weather cycles (e.g., El Niño, Pacific Decadal Oscillation) and fluctuating predator-prey cycles, there is little doubt that many depletions are strongly associated with growing human population pressures and excessive harvest rates. More than 40% of the world's marine fishery populations are heavily to fully exploited, depleted or recovering. Overfishing has been implicated in fisheries collapses of Atlantic cod, haddock, and yellowtail flounder in the Atlantic, abalone along the Pacific coasts of the U.S. and Canada, and a near collapse of Pacific Coast groundfish (Murray and others 1999). Some species of U.S. bottomfish are now being considered for federal listing as threatened or endangered.

One fishery resource in serious condition in Puget Sound waters is rocky reef bottomfish – primarily rockfish species, but also including lingcod, greenlings and cabezon. In the 1990s, Judge Boldt upheld claims by the treaty tribes of Washington that they were legally entitled to 50% of the salmon harvest. Because this ruling caused extra strain on already strained salmon resources, the Washington Department of Fish and Wildlife (Fish and Wildlife) suggested that people "go bottomfishing" to relieve some of the stress on salmon stocks. And bottomfishing we did go. The results of increased effort on bottomfish were increased catches through the mid-1980s and shrinking catches in the late 1980s and 1990s. For instance, lingcod catches declined from a high of 400,000 pounds in 1983 to only a few thousand pounds by 1995 and a complete closure of the commercial lingcod fishery in 1993. Catches of rockfish showed a similar trend. In North Puget Sound in 1977, anglers averaged 2 rockfish/day/trip. By 1998, this average had declined to less than 1 rockfish/day/trip and rockfish daily limits were reduced from 10 fish/day to only 1 rockfish/day in 2000 (Palsson 1998)

The combination of less fish and smaller fish spells trouble for future generations of bottomfish. There are now many fewer females producing eggs and larvae for the next generation, and the number of eggs being produced by smaller females is drastically less than for the large females that were once common. The result of this "double blow" to reproduction is that egg production by copper rockfish in the 1990s was only about 20% of that measured in the late 1970s (Palsson 1998). Thus, not only have adult fish been depleted, but their ability to replenish future generations of fish is also threatened.

Limits of Conventional Fishery Management Methods

Conventional fishery management techniques (e.g., personal catch limits, size limits, gear restrictions, catch & release) have so far failed to protect many species of rocky reef fishes from over exploitation. One possible exception may be for lingcod, which seem to be rebounding following stringent catch limits and conservation closures (especially seasonal protection of large males protecting egg nests in shallow water). Rockfish, however, continue to suffer depletion despite strong conventional management actions. Rockfish habitat (and thus rockfish) is easy to locate and rockfish are easy to catch in most areas. And rockfish are also caught as bycatch in fisheries targeting salmon, halibut and lingcod. Unfortunately, rockfish possess a physiological quirk that does not allow their air bladders to compensate for rapid changes in depth. The result: most rockfish reeled to the surface are "dead on arrival." So, the only effective way to protect rockfish is to avoid catching them in the first place.

Add to this picture the fact that rockfish are very long-lived fish. Many of our local species live 40+ years and one species, the rougheye rockfish, has been discovered to live 200+ years (Huntala 2001). Add also the fact that rockfish don't start to produce eggs until they're 6 to 12 years old, which means that once rockfish are depleted in an area, it may take a decade or more to reestablish a healthy reproductive stock. And it may take even longer for substantial egg and larvae production to resume, since it is the oldest, largest females that produce the most eggs.

Washington Groundfish Management Plan

The Washington Department of Fish and Wildlife (Fish and Wildlife) released their revised Groundfish Management Plan (Palsson and others 1998) in December 1998. One provision of this plan is:

> "Fisheries shall only be allowed when there is a sufficient number of spawning fish to assure a healthy population (critical threshold). A precautionary approach shall be used to assure that strategies prevent overfishing below a critical threshold…"

In addition, the Groundfish Management Plan states that:

> "Mixed fisheries shall be managed on a weak stock basis whereby the fishery is limited by the strength of the weakest stock."

Given the fact that some species of rockfish are at or nearing the "critical threshold" in many areas of Puget Sound, there is the distinct possibility that many areas in the Sound could be completely closed to rockfish fishing for an indefinite period of time until the stocks can rebound. Of perhaps greater concern is the possibility that other healthy fisheries (e.g., lingcod, greenling, halibut, and some salmon fishing areas) could also suffer closures since these fisheries often catch rockfish as bycatch (i.e., they are "mixed fisheries" because of the rockfish bycatch) and rockfish are the "weakest stock."

Indeed, it can easily be argued that there is presently a virtual closure of rockfishing in most areas of Puget Sound because of the newly instituted 1 rockfish/person/day catch limit. The intended effect of this limit is to discourage fishing for rockfish directly, but still allow a single fish to be kept when caught as part of another fishery.

One Alternative to Closures

An alternative to shutting down wide areas of Puget Sound to rockfish fishing may be creation of "islands of refuge" for a proportion of rockfish stocks. These refuges would provide total protection to spawning fish living within the refuge boundaries, and these spawners could comprise a substantial, or total, portion of the stock required for a spawning stock "critical threshold" population, and would satisfy the precautionary approach principle called for in the Washington Groundfish Management Plan. Thus, with an appropriate portion of spawners protected inside refuges, wide areas of Puget Sound could remain open for fishing regardless of fish densities outside of the refuges.

Unlike our upland areas with their national, state and local parks that protect wildlife and their habitats, marine refuges are a fairly new concept. Marine refuges are known by many names (e.g., marine reserves, marine protected areas, marine parks, marine sanctuaries) and provide various degrees of protection for species living within. Protection may be complete for only one or several species, or complete for all marine life. In the following portions of this paper, refuges that provide full protection for one or more species will be referred to as "Marine Protected Areas" (MPAs).

MPAs offer many potential benefits. Fishery-related benefits include:

1. Increased fish abundance, both inside and outside MPAs.
2. Larger, more mature fish inside MPAs.
3. Increased reproductive output.
4. Enhanced recruitment.
5. Maintenance of genetic diversity.
6. Enhanced fishery yields.
7. Fewer fishery closures.
8. Insurance against stock collapses (precautionary principle).

Non-fishery-related benefits include:

1. Increased species diversity.
2. Increased community stability.
3. Enhanced scientific opportunities to compare natural systems with fished systems.
4. Enhanced non-fishery activities (e.g.. diving. ecotourism). and
5. Enhanced community participation in protecting and understanding our marine ecosystems (Dugan and Davis 1993; Bohnsack 1993).

The International Experience

Internationally, MPAs date back to at least the 1970s, with no-take reserves now established in New Zealand, Australia, the Philippines, Kenya, South Africa, France, Barbados, Belize, Canada and the U.S. (Bennett and Attwood 1991; McClanahan and Kaunda-Arara 1996; Petrachenko and Thompson 1998; Rakitin and Kramer 1996; Sobel 1993). Although some MPAs established in these countries have not had adequate monitoring, or have been in existence for only a short time, most evidence from these countries supports the concept of MPAs as “islands of refuge” for targeted species. Studies from many of these areas confirm that there are more fish and larger fish within MPA boundaries. In Australia, fishing near MPAs has increased and is referred to as “fishing the line.” Fishers have discovered that good fishing and the largest fish are likely to be caught near MPA boundaries (Bohnsack 1993).

The Puget Sound Experience

Two bottomfish MPAs in Puget Sound have been in place long enough to evaluate their success in creating or restoring bottomfish populations. The first of these, the Edmonds Underwater Park (EUP), was created by diver organizations and consists solely of artificial reef structures. EUP was created in 1970 and fish abundance and size were evaluated in the mid-1990s, approximately 25 years following its establishment. Diver transect surveys of EUP were conducted by Fish and Wildlife from 1993 through 1996. Results of these surveys showed that copper and black rockfish and lingcod were more abundant at EUP compared to four other comparable fished sites. Both copper rockfish and lingcod were about 10 times more abundant at EUP and black rockfish were 3-9 times more abundant (Palsson and others 1997 1998). In addition, fish at EUP were substantially larger than in the fished areas. For instance, copper rockfish averaged 42.9 cm at EUP compared with 29.1 cm at the fished sites. More fish and larger fish also translates into much greater egg production. Estimates of egg production for rockfish and lingcod at EUP vs. fished areas have shown that egg production can be as much as 100 times greater for copper rockfish and 10 times greater for lingcod in protected areas (Palsson and others 1997 1998).

Shady Cove (SC), near Friday Harbor, San Juan Island, is the second Puget Sound MPA example. This MPA site was established in 1990 and monitored as recently as 1997, seven years following initial

protection. Survey results in 1997 showed that copper rockfish were twice as plentiful at SC compared to a fished area at nearby Turn Island, and their average size was greater. Survey results were similar for lingcod densities and sizes (Palsson and others 1997, 1998).

Support for Marine Protected Areas

Scientific Support for MPAs

At a February 2001 meeting of the American Association for the Advancement of Science (AAAS), a "Scientific Consensus Statement on Marine Reserves and Marine Protected Areas" was released by the National Center for Ecological Analysis and Synthesis (NCEAS) based at the University of California (see internet website: http://www.nceas.ucsb.edu). This consensus statement, signed by 161 national and international leading marine scientists stresses that:

> "Networks of reserves will be necessary for long-term fishery and conservation benefits" and that:
>
> "Existing scientific information justifies the immediate application of fully protected marine reserves as a central management tool."

Likewise, a NOAA Technical Workshop on "Marine Harvest Refugia for West Coast Rockfish" held at Pacific Grove, California in 1998 (Yoklavich 1998) was attended by 38 leading marine fisheries scientists. They concluded that:

> "There was general consensus that marine harvest refugia exemplify a precautionary approach to the management and conservation of rockfish resources on the West Coast."

They further recommended that:

> "…we have sufficient understanding of the problems associated with [marine harvest refugia] management and conservation to proceed with the process of implementing refugia."

Federal Support of MPAs

On May 26, 2000, President Clinton signed Executive Order 13158 establishing a new Marine Protected Areas Initiative and an MPA Center in Washington D.C. The initiative directs various marine-related federal agencies to work together to help establish a new network of MPAs.

State and Local Support for MPAs

Fish and Wildlife supports the idea of future establishment of a system of statewide MPAs for a variety of habitats and species. The recently revised Puget Sound Groundfish Management Plan (Palsson and others 1998) states:

> "The Department recognizes that substantial expanses of all habitats may need to be designated as no-take harvest refuges."

Fish and Wildlife has, in the last decade or so, established 10 new MPA sites in Puget Sound, not including the existing Edmonds Underwater Park. Many of these sites were established as MPAs following requests from local fishers and dive groups. In North Puget Sound, the San Juan County Board of Commissioners followed recommendations by their newly appointed MRC to establish eight new rocky reef reserves (i.e., no-take MPAs) in 1998. Although these sites are fairly small, they do have the potential to create islands of protected "brood stock" for rockfish, lingcod and other rocky reef bottomfish. The Canadian government established the first official Canadian MPA at Race Rocks, just west of San Juan Island off the coast of Victoria, B.C., (see internet website: http://www.racerocks.com). Other Canadian MPA sites are now being considered in the southern Strait of Georgia area.

A joint Puget Sound/Georgia Basin International Task Force suggests the development of a regional system of MPAs (Mills and others 1999). One recommendation resulting from a Task Force workshop held in Bellingham in May 1999 was that:

> "'No regrets' [MPA] sites could be developed early (these are sites that have obvious value, an obvious need for protection, and where opposition is likely to be minimal given the importance of the area)."

Skagit County MPA Initiative

Fishers and divers have reported a scarcity of rocky reef bottomfish, especially rockfish species, around a dozen or so islands of the eastern San Juan Archipelago within the borders of Skagit County. Fish and Wildlife catch statistics and video surveys verified depletion of bottomfish (both in number and size) (Palsson 1998).

A number of years ago the federal government proposed formation of a Northwest Straits National Marine Sanctuary in North Puget Sound to help solve the problem of depletion of our marine resources. This proposal failed because of strong local opposition to perceived federal intervention in local affairs. Because important marine habitat and resource conservation issues still remained to be solved, a bipartisan effort by U.S. Senator Patty Murray (D) and U.S. Congressman Jack Metcalf (R) led an effort for congressional approval for the Northwest Straits Marine Conservation Initiative in 1998. This initiative established the Northwest Straits Commission (NWSC) to work with local interests to take a grass roots approach to solving our marine resource problems.

Marine Resources Committees

Once established, the NWSC worked with seven northwest Washington counties to encourage each board of commissioners to appoint a Marine Resources Committee (MRC). Each of the seven counties (Whatcom, Skagit, San Juan, Island, Snohomish, Jefferson, Clallam) have now convened an MRC to work on marine resource issues critical to their location. Skagit County MRC was formed in the fall of 1999 and has been working on water quality, fisheries and habitat issues since that time. One of the highest priorities identified by Skagit MRC was the depletion of bottomfish resources. With a small grant provided by the NWSC, Skagit MRC has spent the last year evaluating options for restoring rocky reef bottomfish populations in Skagit County waters.

To the west, San Juan County MRC (established prior to formation of the NWSC), with approval of the county Board of Commissioners, established eight new voluntary no-take MPAs in San Juan County waters in 1998 (Kaill 1999). Their efforts have provided a convenient template for Skagit MRC to follow in proposing Skagit County MPAs. With their example in hand, Skagit MRC initiated Phase I of a several year effort to explore the positive and negative aspects of local bottomfish MPAs and to conduct public education/outreach meetings. At each of five public meetings (plus presentations to several civic organizations) questions from the public were answered and citizen suggestions (both pro and con) were tabulated. Additionally, fishers and divers were asked to put stickers on a county map showing: (1) places where bottomfishing used to be good but is now poor, and (2) places where fishers and divers do not want to see MPAs established (where fishing is still good or MPAs conflict with other fisheries—especially salmon). The goal of this effort was to identify areas with good rocky reef habitat (input from Fish and Wildlife, fishers and divers) that are now depleted and don't conflict with other fisheries. Thus, MPA creation in these areas would provide long-term fish protection and allow spawners to mature without removing significant fishing opportunities now present.

As of the end of March 2001, Skagit MRC has met with about 250 interested county citizens, obtained their feedback, and are in the process of writing a final report that will summarize Phase I findings. This report will also identify a "long list" of six to ten potential MPA sites in Skagit County waters. We anticipate that Phase II work will include evaluations of the "long list" candidate sites, integration of science and public input, and selection of three to four final MPA sites to be recommended to the county Board of Commissioners for protection. Final selection of sites will also include additional public review and comment. With luck, and close attention to a grass roots public involvement process, we hope to see MPAs

established in Skagit County waters by the end of 2002. Phase III will then deal with start-up issues including: public education, signage at boat launches, creation of a brochure showing MPA locations, creation of volunteer patrols, and initiation of baseline and long-term monitoring programs.

Tribal Validation

Tribal involvement and validation of local MPAs will be a key element in any MPA creation. The rights of treaty tribes to harvest up to 50% of salmon (Boldt Decision), shellfish and marine fish (Rafeedie Decision) within Puget Sound have been upheld by federal courts, and the treaty tribes are now co-managers of those resources with the State of Washington. Many of the treaty tribes residing in the Puget Sound Basin have usual and accustomed (U & A) fishing grounds located in the San Juan Islands, including Skagit County. Generally, the tribes have been receptive to measures that are designed to protect or enhance fishery resources, as long as the 50% allocation between tribal and non-tribal fishers is not jeopardized. Representatives of several tribes located in Skagit County sit on the Skagit MRC. However, any final tribal agreements on MPAs may well have to be negotiated between the various treaty tribes and between the tribes and the state co-managers.

Enforcement of MPAs

Current efforts by the Skagit MRC are directed toward voluntary compliance by fishers and divers. County governments have little, if any, legal ability (or desire) to police the use of state and tribal marine resources. Feelings are mixed on whether compliance should be voluntary or regulatory. Those in favor of voluntary compliance argue that local education, patrol and peer pressure measures will be as, or more, effective than state-mandated enforcement. Others, however, argue that without the deterrent of state enforcement, a small but greedy minority may effectively negate any gains an MPA might achieve. Either way, there will be those individuals who will choose to ignore MPA provisions, enforced or not. It will be important that citizens, fishers and divers get involved to deal with these harmful abuses, since even minimal fishing pressure in a bottomfish MPA can quickly remove spawning females that may be as old as 50 or 60 years. Once fish like these are removed, it will require several decades to replace them and their egg production capacity.

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References

Bennett, B.A. and C.G. Attwood. 1991. Evidence for recovery of a surf-zone fish assemblage following the establishment of a marine reserve on the southern coast of South Africa. Mar. Ecol. Prog. Ser. **75**: 173-181.

Bohnsack, J.A. 1993. Marine reserves: They enhance fisheries, reduce conflicts, and protect resources. Oceanus, **Fall 1993**: 63-71.

Dugan, J.E. and G.E. Davis. 1993. Applications of marine refugia to coastal fisheries management. Can J. Fish. Aquatic Sci. **50**: 2029-2042.

Huhtala, P. 2001. The sex life of rockfish. Tidepool internet website: http://www.tidepool.org/features/rockfishsex.cfm.

Kaill, M. 1999. Bottom fish recovery project. Final Report for San Juan County Marine Resources Committee, Friday Harbor, WA. 184 pp.

McClanahan, T.R. and B. Kaunda-Arara. 1996. Fishery recovery in a coral-reef marine park and its effect on the adjacent fishery. Conservation Biol. **10**(4): 1187-1199.

Mills, M.L., D. Clarkson and L. Scinto. 1999. Strategies for developing and applying marine protected area science in Puget Sound/Georgia Basin. Proceedings of a workshop held in Bellingham, WA May 1999.

Murray, S., R.F. Ambrose, J.A. Bohnsack, L.W. Botsford, M.H. Carr, G.E. Davis, P.K. Dayton, D. Gotshall, D.R. Gunderson, M.A. Hixon, J. Lubchenco, M. Mangel, A. MacCall, D.A. McArdle, J.C. Ogden, J. Roughgarden, R.M. Starr, M.J. Tegner and M.M. Yoklavich. 1999. Notake reserve networks: Sustaining fishery populations and marine ecosystems. Fisheries, **24**(11): 11-25.

Palsson, W.A 1998. Monitoring the response of rockfishes to protected areas. Pp. 64-73 in: Marine Harvest Refugia for West Coast Rockfish: A Workshop, M.M. Yoklavich(editor), NOAA Technical Memorandum Number: NOAA-TM-NMFS-SWFSC-225. 159 pp.

Palsson, W.A., J.C. Hoeman, G.G. Bargmann and D.E. Day. 1997. 1995 status of Puget Sound bottomfish stocks (revised). Report # MRD97-03, Washington Department of Fish and Wildlife, Olympia, WA. 98 pp.

Palsson, W.A., T.J. Northrup and M.W. Barker. 1998. Puget Sound Groundfish Management Plan (revised). Technical Report by Washington Department of Fish and Wildlife, Marine Resources Division, Olympia, WA. 43 pp.

Petrachenko, D. and D. Thompson. 1998. Marine protected areas: A strategy for Canada's Pacific Coast. Discussion Paper by the governments of Canada and British Columbia. 27 pp.

Rakitin, A and D.L. Kramer. 1996. Effect of a marine reserve on the distribution of coral reef fishes in Barbados. Mar. Ecol. Prog. Ser. **131**: 97-113.

Sobel, J. 1993. Conserving biological diversity through marine protected areas: A global challenge. Oceanus, **Fall 1993**: 19-26.

Yoklavich, M.M. 1998. Marine harvest refugia for West Coast rockfish: An introduction to the workshop. Pp. 1-5 in: Marine Harvest Refugia for West Coast Rockfish: A Workshop, M.M. Yoklavich (editor), NOAA Technical Memorandum Number: NOAA-TM-NMFS-SWFSC-225. 159 pp.